XPS/XPS-E

User's Manual

© COMSOFT

XPS/XPS-E User's Manual

Version: 1.2
Date: 04. May 1999
Order No.: 4003-7-G00-H-E

COMSOFT GmbH
Wachhausstraße 5a
D-76227 Karlsruhe

Phone: +49/ 721/ 9497- 0
Fax Hotline: +49/ 721/ 9497- 299
Email: support@comsoft.de
Internet address: www.comsoft.de

This documentation has been drawn up carefully, but, in spite of all efforts, errors may occur. Information from the part of our customers that will help to improve comprehensibility of the document and remove errors will be appreciated.

The information contained therein can be amended without prior notice and does not represent any obligation on the part of COMSOFT**.** We do not assume any kind of responsibility for possible inconsistencies and their consequences. This work including all its parts is copyrighted. Every usage of it which lies beyond the tight limits of the copyright are prohibited and punishable. This applies especially to copies, translations, microfilms as well as to feeding into and processing in electronic systems.

All other product or company names mentioned in this document may present trademarks of the respective owners.

Contents

1 Introduction 1

2 Setting into Operation 2

2.1 Connection of the Gateway 3
2.1.1 XPS Desk Model 3
2.1.2 XPS-E Top Hat Rail Model 4
2.1.3 Proceeding 5
2.2 Test of PROFIBUS Connection 5
2.3 Parameterisation 6
2.4 set_prm Parameterisation 7
2.4.1 GSD File 8
2.4.2 Slave_diag Device Diagnostics 9
2.4.3 Parameter Description 10
2.4.3.1 Baud Rate 10
2.4.3.2 Character Transmission Mode 10
2.4.3.3 Handshake Flow Control 11
2.4.3.4 XOFF_timeout – Timeout of Software Handshake 11
2.4.3.5 DP-Data Transmission Mode 12
2.4.3.6 Extended Gateway configuration data 12
2.4.3.7 Trigger character for Serial triggert mode 13

3 Data Exchange 14

3.1 Send Data 15
3.2 Receive Data 15
3.2.1 Poll Mode 16
3.2.2 Serial triggered Mode 18
3.2.3 Request Mode 19
3.3 Send and Receive Data 22

4 Status and Error Messages 23

4.1 External Device Diagnostics 23
4.2 Communication Status 24

5 Connector Assignment and Cabling 25

5.1 PROFIBUS 25
5.1.1 Connector Assignment 25
5.1.2 PROFIBUS Terminating Resistor 26
5.1.3 Cabling 27

5.2 Serial Interface 28
5.2.1 Connector Assignment RS232 (XPS and XPS-E) 28
5.2.2 Cabling RS232 29
5.2.2.1 Cabling without Hardware Handshake 29
5.2.2.2 Cabling with Hardware Handshake 29
5.2.3 Connector Assignment RS422/485 (XPS-E only) 30
5.2.4 Cabling RS422 without Hardware Handshake 30
5.2.5 Cabling RS422 with Hardware Handshake 31

6 Frequently Asked Questions: FAQ 32

7 Technical Data 33
7.1 XPS 33
7.1.1 PROFIBUS-DP Interface 33
7.1.2 RS232 Interface 34
7.1.3 Connection 34
7.1.4 Operating Indicators and Controls 34
7.1.5 Technical Data 35
7.2 XPS-E 36
7.2.1 PROFIBUS-DP Interface 36
7.2.2 Serial Interface 37
7.2.3 Connection 37
7.2.4 Operating Indicators and Controls 37
7.2.5 Technical Data 38

8 PROFIBUS-DP Certificate 39

9 CE- Conformity Declaration 40

List of Tables

Table 1: **set_prm** 7
Table 2: **slave_diag** 9
Table 3: Baud Rate of Serial Interface Octet 12 10
Table 4: Character Transmission Modes Octet 13 10
Table 5: Handshake Modes Octet 14 11
Table 6: Data Transmission Modes Octet 16 12
Table 7: ext. configuration byte Octet 17 12
Table 8: Triggerzeichen Octett 18 13
Table 9: Data Transmission Format at **data_exchange_req** 14
Table 10: Data Transmission Format at **data_exchange_res** 14
Table 11: Pin Assignment PROFIBUS 25
Table 12: Connector Assignment RS232 Interface 28
Table 13: Connector Assignment RS422/485 Interface 30

List of Figures

Figure 1: Typical Connection of an XPS/XPS-E Gateway 1
Figure 2: Connectors and Interfaces of XPS 3
Figure 3: Connectors and Interfaces of XPS-E 4
Figure 4: Data Reception in Poll Mode 16
Figure 5: Receive data in serial triggered mode (trigger character : 0x0A) 18
Figure 6: Data Reception in Request Mode 20
Figure 7: Combined Send- and Receive Request 22
Figure 8: Byte Definition of external Device Diagnostics 23
Figure 9: Byte Definition of Communication Status 24
Figure 10: Assignment of PROFIBUS Terminator Type A 26
Figure 11: Connection of a PROFIBUS-DP Slave within a Segment 27
Figure 12: RS232 Cabling without Hardware Handshake 29
Figure 13: RS232 Cabling with Hardware Handshake 29
Figure 14: RS422 Cabling with Hardware Handshake 30
Figure 15: RS422 Cabling with Hardware Handshake 31
Figure 16: PROFIBUS-DP Certificate No. Z00284 39

1 Introduction

The intelligent PROFIBUS-DP gateways of COMSOFT's XPS series allow the coupling of any serial devices with RS232 or RS422/485 interface to PROFIBUS-DP according to the European Standard EN50170. The protocol conversions required for the coupling are executed either by means of a transparent universal driver or by loadable device-specific converters. The following figure shows a typical connection:

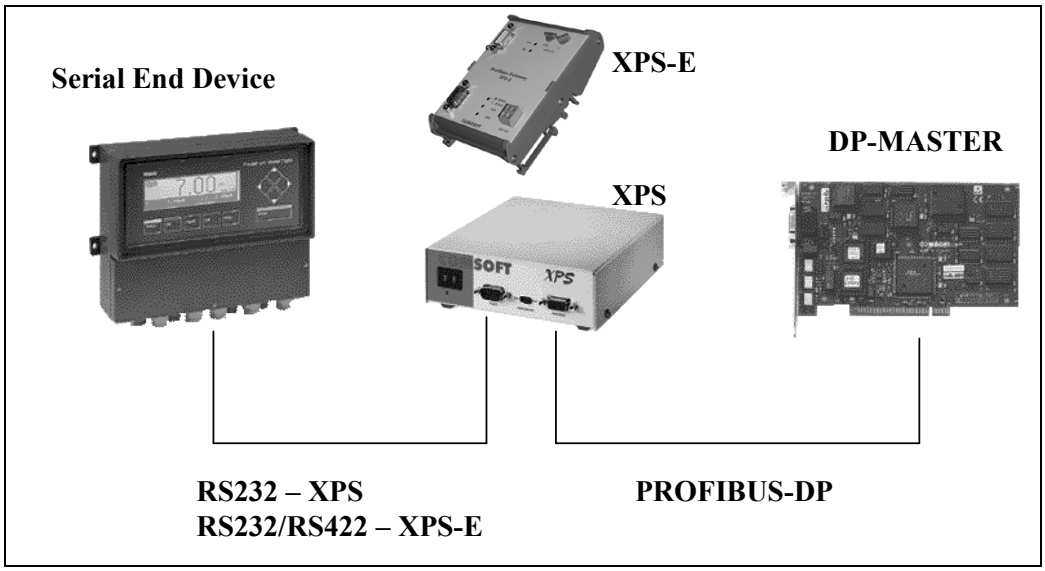


Figure 1: Typical Connection of an XPS/XPS-E Gateway

2 Setting into Operation

When developing the XPS products, COMSOFT put great stress on an easy installation. Following this aim, **no** external devices, e.g. configuration tools on a PC are required to execute the configuration. All connections are realised by D-SUB connectors, power plug (EN 60320) or spring clip terminals which can all be accessed and loosened easily. The PROFIBUS station address is set via coding switches. All further settings are done via *UserParameter* of the *SetParam* telegram of PROFIBUS-DP. This parameterisation is executed, simplified by the deliverable **GSD file** either via the configuration tool of the connected PROFIBUS-DP Master or by the user program.

2.1 Connection of the Gateway

2.1.1 XPS Desk Model

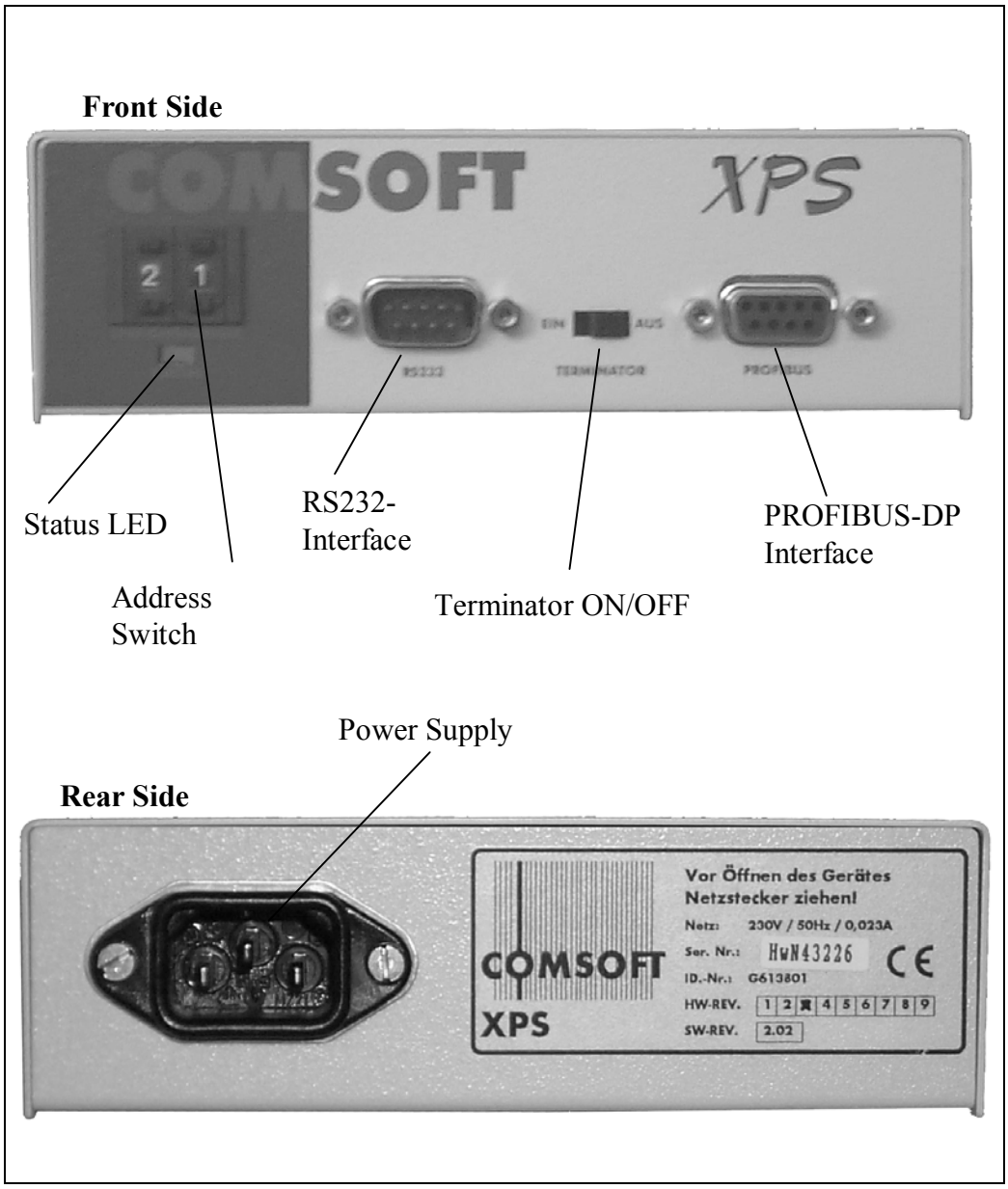


Figure 2: Connectors and Interfaces of XPS

2.1.2 XPS-E Top Hat Rail Model

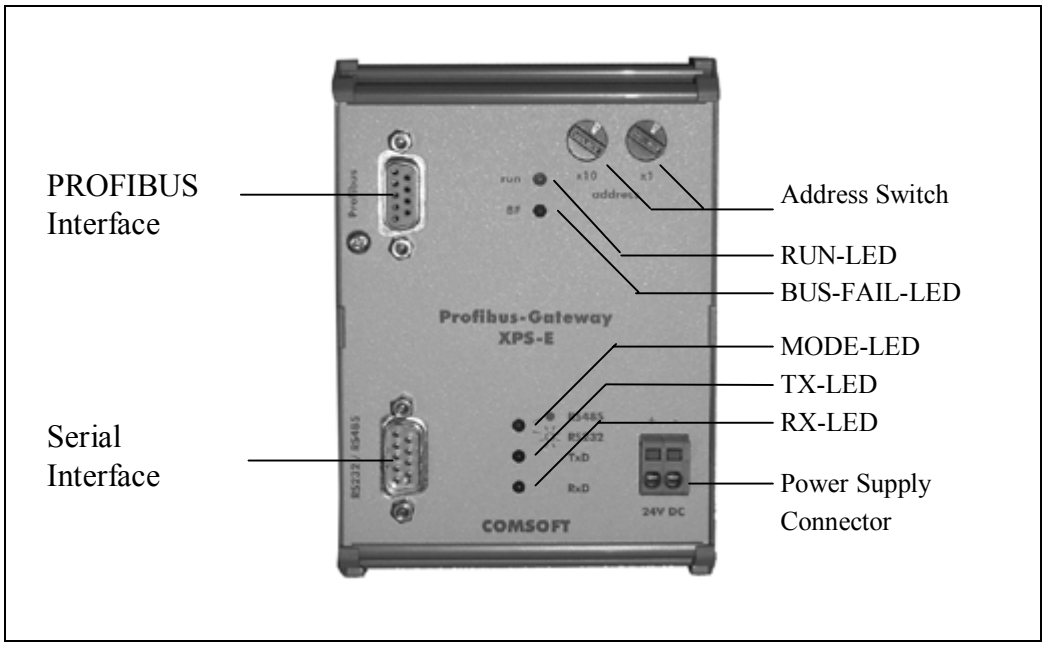


Figure 3: Connectors and Interfaces of XPS-E

2.1.3 Proceeding

By executing the following steps, the XPS/XPS-E Gateway can be set into operation:

1. Connect XPS/XPS-E to PROFIBUS by using a standard PROFIBUS cable with corresponding D-SUB PROFIBUS connector. For the connector assignment please refer to chapter Connector Assignment and follow the Installation Guidelines for PROFIBUS (No. 2.112, PNO).

2. Connect the serial end device with XPS/XPS-E (Connector Assignment refer to 5.2).

3. Check your PROFIBUS network with regard to an unused Slave address and adjust this free address at the coding switch of XPS/XPS-E.

4. Plug in the power supply. In case of XPS this is done by means of a power plug (EN 60320) at the rear side of the device. The power supply of the XPS-E is connected by spring clips at the front side.

As soon as the device is powered, the Status/Busfail LED is flashing red.

Note *The Status/Busfail LED is flashing red until the device is parameterised and configured. In this status, no data exchange can take place (neither send nor receive). Only after successful parameterisation and configuration the Status/Run LED is flashing green. Now, the device is ready for data exchange.*

2.2 Test of PROFIBUS Connection

If you have a PROFIBUS-DP configuration tool, you can test the PROFIBUS connection to the XPS/XPS-E Gateway. For this purpose, load the deliverable GSD file into your configuration tool.

The DP Master shall now configure XPS/XPS-E. If this configuration is successful, the Status/Run LED is flashing green.

If you do not have a PROFIBUS-DP configuration tool or if you wish to change the pre-defined parameters (**`User_Prm_Data`**) in the GSD file, please refer to the following chapters for the parameterisation.

2.3 Parameterisation

The parameterisation data of XPS/XPS-E consists of 7 DP-Slave standard bytes and 16 device-specific parameters bytes (**User_Prm_data**, -> **user_prm_len** = 16). As user diagnostic data, 8 additional diagnostics bytes are available. (**diag_len** = 8).

1. For initialisation of XPS/XPS-E send a **set_prm** telegram. For this purpose, use the parameters for PROFIBUS-DP and the serial interface described in chapter 2.4.

2. Check the parameterisation with **slave_diag**.

3. Then use the command **chk_cfg** to configure the XPS/XPS-E. Prior to that, the configuration can be read with the command **get_cfg** from XPS/XPS-E. If **chk_cfg** is executed directly after the initialisation, the maximum **data_exchange** telegram length is loaded from XPS/XPE-E. For shorter **data_exchange** telegram length select one of the possible configurations which are defined in the GSD file or select those arbitrarily according to the PROFIBUS-DP standard.

After successful parameterisation XPS/XPS-E is prepared for data exchange. The Status/Run LED is now flashing green.

Note

You can verify the parameterisation and configuration telegram by means of `slave_diag`.

In the following, only those parameters are described that are required for operating the XPS/XPS-E. For the significance of the remaining PROFIBUS-DP standard parameters please refer to the standard EN50170 and the GSD file.

2.4 set_prm Parameterisation

The Bytes 1-7 are PROFIBUS-DP standard parameters, Byte 8-23 are device-specific parameters (**usr_prm**).

Octet	Parameter Name	Value
1	**Station_status**	0x80*
2	**WD_fact_1**	0x00
3	**WD_fact_2**	0x00
4	**Min T_{SDR}**	55
5	**Ident_Number [0]**	0x95
6	**Ident_Number [1]**	0x10
7	**Group_Ident**	0x00
8..11	Reserved	---
12	Baud Rate setting of serial interface	See Table 3
13	Character Transmission Mode of serial interface	See Table 4
14	Handshake setting of serial interface	See Table 5
15	XOFF-Timeout of serial interface	See 2.4.3.4
16	Receive Mode of PROFIBUS interface	See Table 6
18	Trigger character for serial triggered mode (usually LF (0x0A))	See Table 8
19..23	Reserved	---

Table 1: **set_prm**

(*) **Freeze_Req** and **Sync-Req** are not supported.

2.4.1 GSD File

Next to standard parameters the parameters for the serial interface are included in the GSD file. They are listed under the **User_Prm_Data**. The values correspond to those described under chapter 2.3. A modification of these parameters can be made by any kind of ASCII editor. Please note that the number of parameters must not be changed and that the first four and last six parameter bytes are to be set to 0.

In the following, the default settings of the GSD for serial interfaces of XPS/XPS-E are listed.

9600 Baud / 8Bit / No Parity / 1 Stopbit / no Handshake / no Timeout / Poll-Mode / RS232-Mode

This corresponds to the following entry in the GSD file:

User_Prm_Data = 0 0 0 0 96 56 78 0 80 0 0 0 0 0 0 0

2.4.2 Slave_diag Device Diagnostics

Octet 1-7 are PROFIBUS-DP Standard, Octet 8-14 are the device-specific diagnostics parameters (external diagnostics).

Octet	Parameter	Value
1	**Station_status_1**	Bit7 Diag.Master_Lock Bit6 Diag.Prm_Fault Bit5 Diag.Invalid_Slave_Response Bit4 Diag.Not_Supported Bit3 Diag.Ext_Diag Bit2 Diag.Cfg_Fault Bit1 Diag.Station_Not_Ready Bit0 Diag.Station_Non_Existent
2	**Station_status_2**	Bit7 Diag.Deactivated Bit6 reserved Bit5 Diag.Sync_Mode Bit4 Diag.Freeze_Mode Bit3 Diag.WD_On Bit2 must be set to 1 Bit1 Diag.Stat_Diag Bit0 Diag.Prm_Req
3	**Station_status_3**	Bit7 Diag.Ext_Diag_Overflow Bit6..0 reserved
4	**Master_Address**	Master address or 0xFF, if Slave is not yet parameterised.
5	**Ident_Number[0]**	0x95
6	**Ident_Number[1]**	0x10
7	Number of ext. diagnostic bytes	8
8	XPS/XPS-E state	See 4.1
9	Baud Rate of the serial interface	See 2.4.3.1
10	Character Transmission Mode of serial interface	See 2.4.3.2
11	Handshake setting serial interface	See 2.4.3.3
12	XOFF-Timeout of serial interface	See 2.4.3.4
13	Receive Mode of DP- interface	See 2.4.3.5
14	Setting of driver physics of serial interface (RS232/485)	See 2.4.3.6
15	Trigger character for Serial triggerd Mode	0x0A

Table 2: **slave_diag**

2.4.3 Parameter Description

The parameters marked with (*) are the default values. These are used if inadmissible parameters are entered during parameterisation.

2.4.3.1 Baud Rate

Baud Rate (bit/s)	Value (dec)	Value (hex)
150	1	0x01
300	3	0x03
600	6	0x06
1.200	12	0x0C
2.400	24	0x18
4.800	48	0x30
9.600 *	96	0x60
19.200	192	0xC0

Table 3: Baud Rate of Serial Interface Octet 12

2.4.3.2 Character Transmission Mode

Transmission Mode	Value (dec)	Value (hex)
8 Data bits, No Parity, 1 Stopbit (8N1) *	56	0x38
7 Data bits, No Parity, 2 Stopbits (7N2)	78	0x4E
7 Data bits, Even Parity, 1 Stopbit (7E1)	69	0x45
7 Data bits, Odd Parity, 1 Stopbit (7O1)	79	0x4F

Table 4: Character Transmission Modes Octet 13

Note *The operating mode: 7 data bits, No Parity, 1 StopBit is not supported.*

2.4.3.3 Handshake Flow Control

If data is exchanged via the serial interface, XPS/XPS-E supports the following modes for the handshake:

- **No Handshake**
- **Hardware Handshake**. The receive data flow can be controlled at the respective device by setting or re-setting the RTS-/CONTROL signal (CTS/INDICATION=0 -> no sending). A corresponding example for cabling can be found under chapter 5.2.2 and 5.2.3.
- **Software Handshake**. The receive data flow can be stopped by the respective device by sending the control character XOFF (0x13). The sending procedure will only be re-started if a XON character (0x11) is received or a Timeout (XOFF-Timeout) for the receipt of the XON character.

The interruption of the sending procedure or the XOFF timeout is shown in the status byte of XPS/XPS-E (see chapter 4.2) by means of the bit XOFF_CTS_FLAG.

Handshake Mode	Value (dec)	Value (hex)
Hardware Handshake (CTS, RTS for RS232 and CONTROL/INDICATION for RS422)	72	0x48
Software Handshake	83	0x53
No Handshake *	78	0x4E

Table 5: Handshake Modes Octet 14

2.4.3.4 XOFF_timeout – Timeout of Software Handshake

The XOFF timeout is calculated by means of VALUE * 100ms. This value is entered into Octet15 of the parameterisation data. If no software handshake is entered, this value is insignificant.

Note *If the value 0 is given, the timeout is set to 10 seconds.*

2.4.3.5 DP-Data Transmission Mode

To offer the user several possibilities to adapt his application optimally to the gateway functionality of XPS/XPS-E, 3 data transmission modes can be used. The corresponding description is found under chapter 3.

Data Transmission Modes	Value (dec)	Value (hex)
Poll Mode *	80	0x50
Request Mode	82	0x52
Serial triggered Mode	83	0x53

Table 6: Data Transmission Modes Octet 16

2.4.3.6 Extended Gateway configuration data

ext. Configuration byte	Bit	Function
	Bit7 ..Bit2	Reserved
	Bit1	Double baud rate
	Bit0	RS232(0)<->RS422(1)

Table 7: ext. configuration byte Octet 17

BIT0: RS232<->RS422 – Serial interface physics

With this parameter the interface physics can be set to RS232(0) or RS485(1). This parameter is only applicable for XPS-E. The desktop model (XPS) does only have an RS232 physics.

BIT1: double Baudrate

Setting this bit doubles the baudrate for the serial interface

Exp: A selected baudrate of 19200 Baud can be increased to 38400 Baud by setting this bit.

BIT7 – Bit2: reserved

2.4.3.7 Trigger character for Serial triggert mode

Here the trigger character for the serial triggerd mode is set. If the seriell receive data stream contains the same sign, all received data up to this character are sent to the DP-Master inclusive the trigger character.

Triggerzeichen	Wert (dez)	Wert (hex)	Wert (ASCII)
LF *	10	0x0A	LF

Table 8: Triggerzeichen Octett 18

3 Data Exchange

Data exchange of XPS/XPS-E is exclusively realised by means of the PROFIBUS-DP service **data_exchange**. The data to be sent by the master correspond to the output data of **data_exchange.req**, the data received correspond to the input data of **data_exchange.res**.

For each send or receive job, at max. 240 Bytes are available while 3 Bytes are headers and the remaining 237 Bytes are user data. If more than 237 Bytes user data shall be sent or received, the application on part of the PROFIBUS-DP Master must split this job into several telegrams.

The data transmission format used from/to XPS/XPS-E has the following structure:

Byte	Telegram Element	Value Range (dec)
1	Receive request number (only request mode)	0 – 255 (see 3.2)
2	Send request number	0 – 255 (see 3.1)
3	Data length N of the following user data	0 – 237*
4..4+N	Telegram data (user data)	0 – 255

Table 9: Data Transmission Format at **data_exchange_req**

Byte	Telegram Element	Value Range (dec)
1	Status of XPS/XPS-E	0 – 255 (see 4.2)
2	Receive Confirmation number of XPS/XPS-E	0 – 255 (see 3.2)
3	Data length N of the following user data	0 – 237*
4..4+N	Telegram data (user data)	0 – 255

Table 10: Data Transmission Format at **data_exchange_res**

(*) maximum number of user data depends on how the DP-Master has configured XPS/XPS-E via the **chk_cfg** service.

Data can be arbitrary characters in the value range 0..255. This however is only valid if XON/XOFF is not used as handshake.

3.1 Send Data

To send data via XPS/XPS-E onto a serial end device, the send flag of XPS/XPS-E must be reset (ref. 4.2 Communication Status, Bit 0 = 0), as otherwise the send data to XPS/XPS-E will be discarded. For a send job, the following data must be included into the telegram.

- Send job number. This job number must be different for each send procedure. Reasonably, the value should be incremented by 1 at every send procedure.
- Send data length. If the data length is set to 0, no data is sent via the serial interface. Otherwise this byte includes the number of the following user data.
- Send data (user data)

3.2 Receive Data

XPE/XPS-E has a 2Kbyte receive data buffer to temporarily store data received from the connected serial end device. For data transfer to the PROFIBUS-DP Master the operating modes Poll mode and Request-Mode are available. The mode will be selected during parameterisation of XPS/XPS-E by the Master (ref. 2.4.3.5). In the Poll mode available receive data will be sent at every **`data_exchange.req`** with the corresponding **`data_exchange.res`** from XPS/XPS-E to the PROFIBUS-DP Master. In the Request mode the XPS/XPS-E sends this data only if in **`data_exchange.req`** a defined byte has been changed (the receive request number). Thus, the polling of existing receive data can be controlled by the Master.

The request mode is recommended for Masters that are polling the slaves cyclically to generate a process image. (application may be too slow to process the current data of the process image).

3.2.1 Poll Mode

In this mode XPS/XPS-E returns with every **`data_exchange`** the data received up to the present time. Apart from the receive data and their lengths a receive data number is entered into the telegram. This confirmation number is automatically incremented if new receive data is available in the telegram. If the receive telegram does not contain new data (data length = 0), the confirmation number remains unchanged.

Note: *If this mode is used when the Master is generating a Process Image according to a Poll List it must be paid attention that this Poll List can be read quickly enough as with every `data_exchange` the process image will be overwritten. This may cause loss of data on part of the application. Loss of data can be noticed when the confirmation number is not subsequent.*

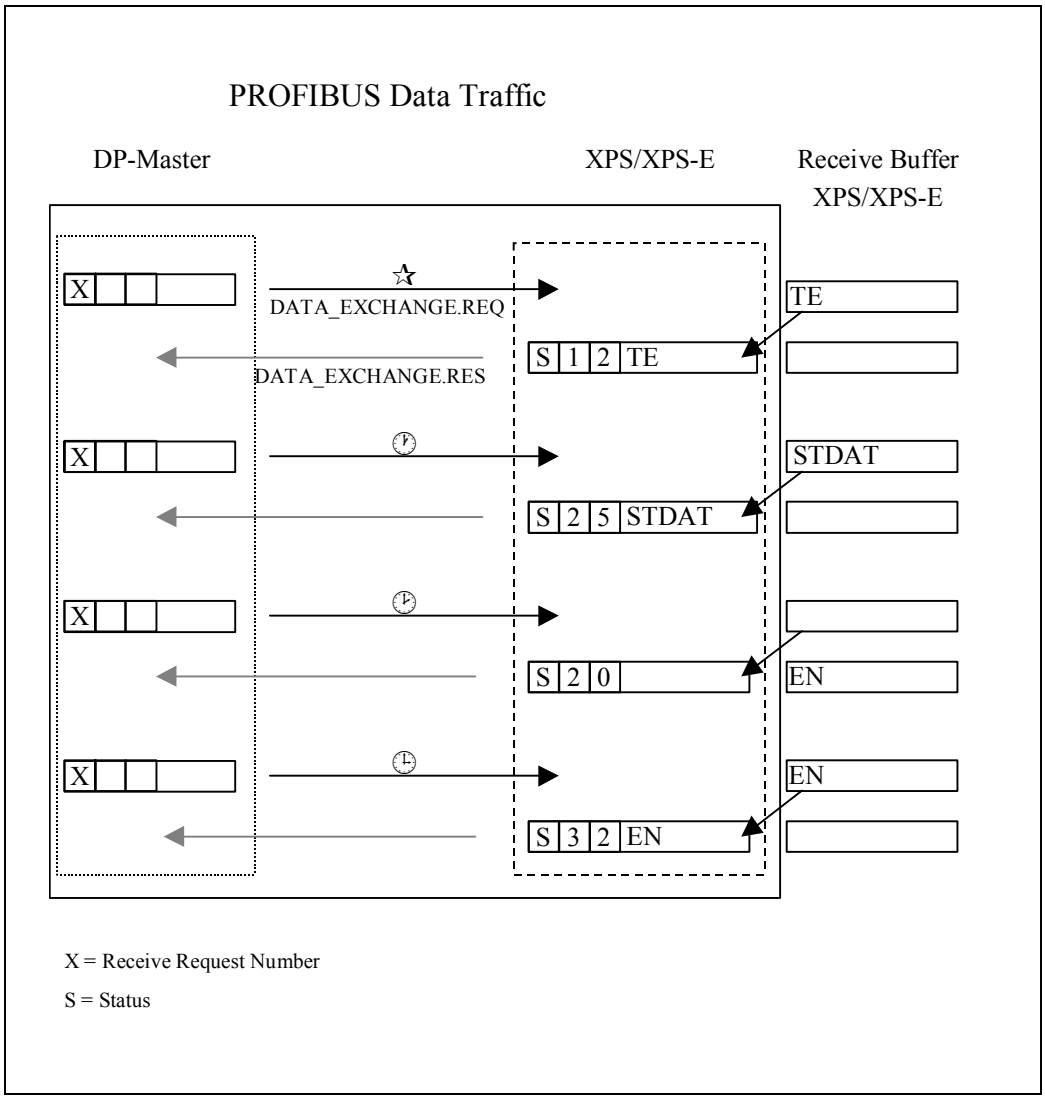


Figure 4: Data Reception in Poll Mode

The telegrams mentioned above can either be started automatically by the Master (cyclically during automatic polling) or by the application.

Note: *The receive request number (X) in Poll Mode may not be set.*

❶ The **data_exchange.req** telegram is sent to XPS/XPS-E. XPS/XPS-E has already received the first characters at the interface. It returns them in the response telegram **data_exchange.res** to the Master. The confirmation is incremented by 1 and the length of the reception data is entered. Moreover, the status (S) of XPS/XPS-E is returned.

❷ New **data_exchange.req** telegram. XPS/XPS-E returns the new data by incrementing the confirmation number by 1.

❸ As response telegram to the **data_exchange.req** telegram, XPS/XPS-E enters the old confirmation number as no new data has been received at the serial interface. The receive data length is set to 0.

❹ XPS/XPS-E has again received new data. The confirmation number is incremented by one and the data returned correspondingly by the **data_exchange.res** telegram to the Master.

If no time guarantee can be given and if data loss has to be excluded under all circumstances, XPS/XPS-E must be run in the request mode.

3.2.2 Serial triggered Mode

In serial triggered mode XPS/XPS-E waits for the termination of the receive data by the trigger character defined within the external user parameters of XPS/XPS-E (usually LF in ASCII-strings). The receive confirmation number is not increased as long as no trigger character is received. After the trigger character is received the Data Exchange Resp.-buffer is updated with the received data inclusive the trigger character. The data Exchange Resp.-buffer does not change as long as the next trigger character is received.

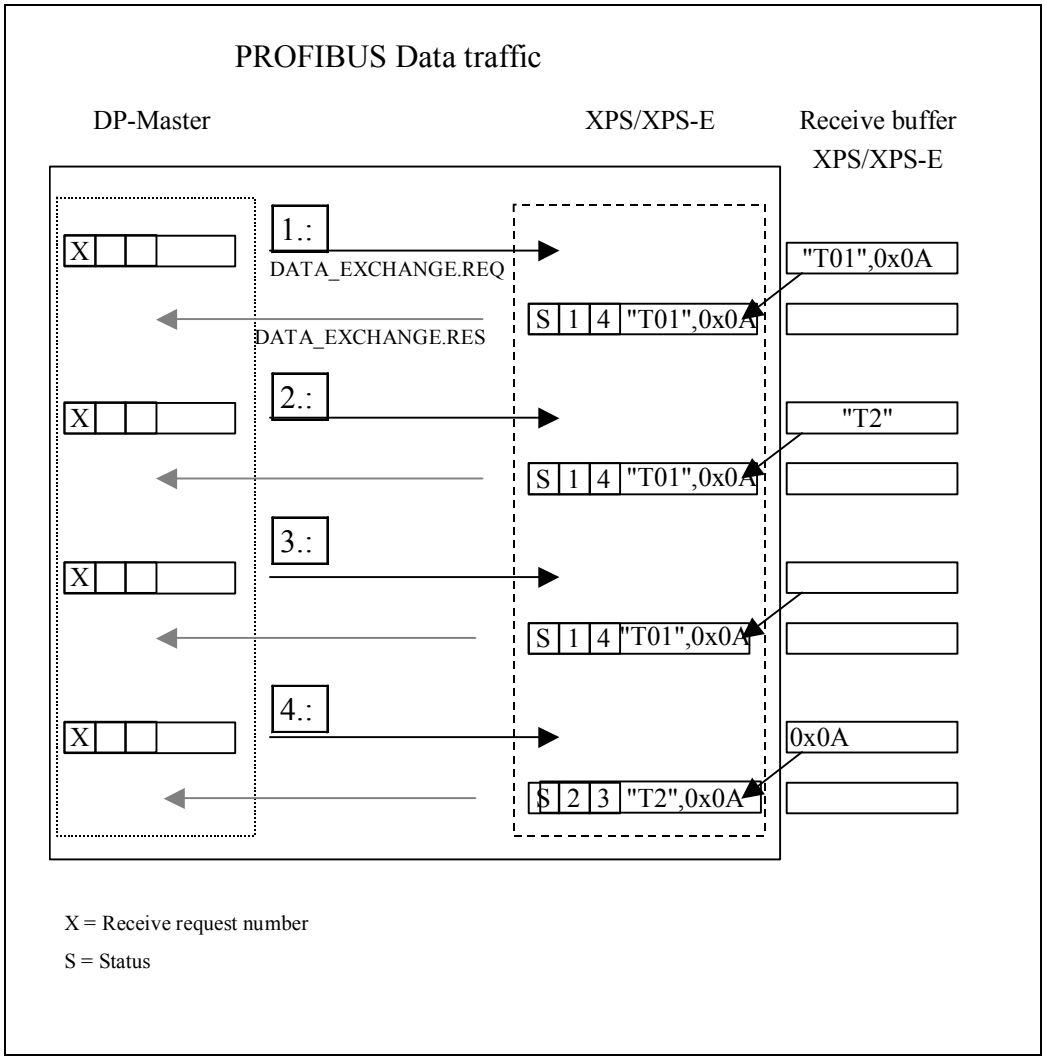


Figure 5: Receive data in serial triggered mode (trigger character : 0x0A)

Hinweis: *Please note, that it is not necessary to set the receive request number (X) in polling/serial Mode*

1. The **data_exchange.req** is transmitted to the XPS/XPS-E. XPS/XPS-E has already received data via the serial interface. This data are transmitted with **data_exchange.res** back to the DP-Master. The receive confirmation number is incremented and data length and status are updated.

2. Next **data_exchange.req** service. XPS/PS-E responds with the old data. New data are in fact received, but they do not contain the trigger character.

3. Next **data_exchange.req** service. XPS/PS-E responds with the old data, because no further serial data were received.

4. Next **data_exchange.req** service. XPS/PS-E has received in the meantime the serial trigger character. The receive confirmation number is incremented, data length, status and **data_exchange.res** buffer are updated with the actual data.

3.2.3 Request Mode

In the request mode the XPS/XPS-E only sends receive data if a modified receive-request number is contained in the request telegram. The data are not returned in the first response telegram but in the response telegram of the subsequent **data_exchange** service. This means that the data are returned always only in the subsequent cycle of the request. If the response telegram contains received data, the XPS/XPS-E confirmation number is incremented by one and returned in the response telegram (as in the poll mode).

Note: *If this mode is used while the master is automatically polling the slaves according to the poll list, the data that have been received last remain in the process image.*

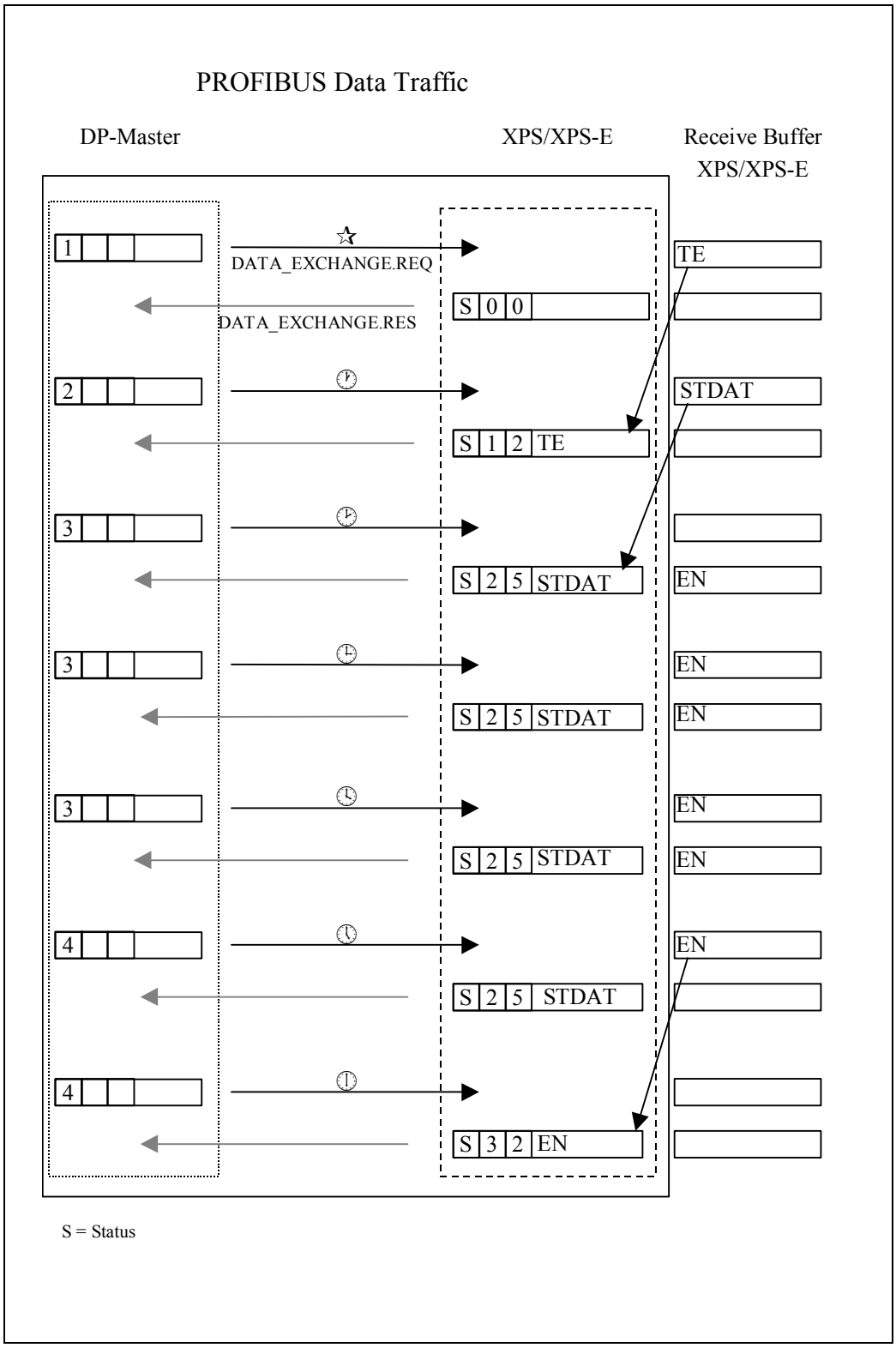


Figure 6: Data Reception in Request Mode

❶ The **`data_exchange.req`** telegram is sent to the XPS/XPS-E which already has received the first characters. It returns them, however, only in the subsequent response telegram **`data_exchange.res`.**

❷ New **`data_exchange.req`** telegram with increased receive-request number (further reception command). XPS/XPS-E returns the data received at point in time ❶. The confirmation number is increased by one.

❸ Another reception command to XPS/XPS-E (receive-request number has been increased). The data that are returned are the data received at point in time ❷.

❹ No further reception command to XPS/XPS-E. XPS/XPS-E returns again the last sent data. XPS/XPS-E has already received new data.

❺ No further reception command to XPS/XPS-E. XPS/XPS-E returns again the last sent data.

❻ This **`data_exchange.req`** contains another reception command. The data are returned, however, only at the next cycle.

❼ No further reception command because the request number has not been increased. The data that are returned are the data received until the point in time of the last read command (❻).

3.3 Send and Receive Data

It is generally possible in both modes to send and receive data simultaneously. The request telegrams described in the previous chapters then have to be completed only by the entries of the transmission command (transmission command number, length of transmission data, data).

Please note that the data are only accepted and transmitted by the XPS/XPS-E if the transmission command number in the **`data_exchange.req`** telegram to the XPS has changed.

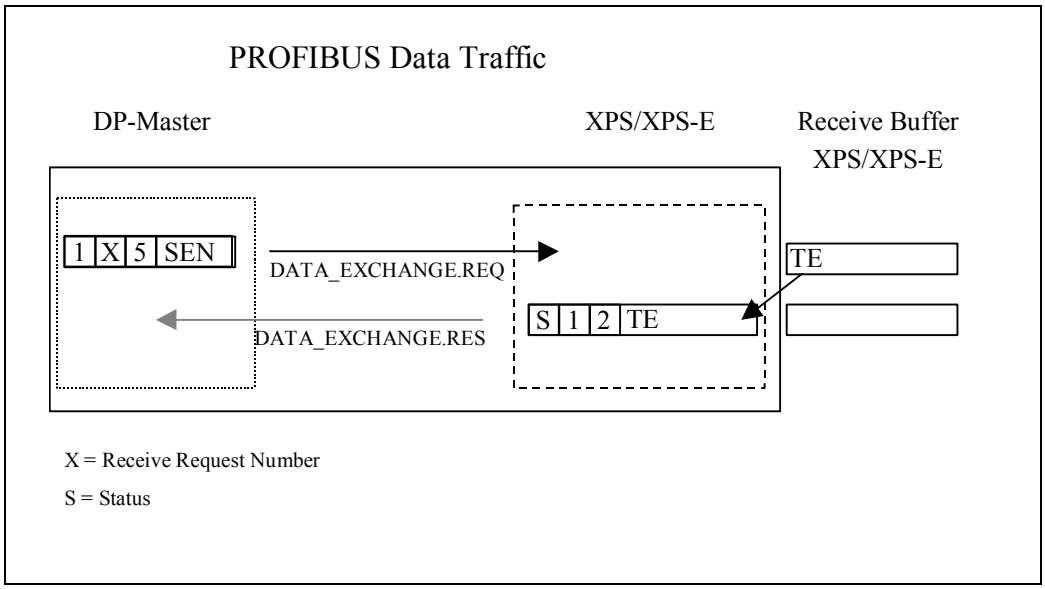


Figure 7: Combined Send- and Receive Request

4 Status and Error Messages

4.1 External Device Diagnostics

External device diagnostics can be realised by means of the service **slave_diag** Octet 8 of the response telegram contains the device status and is encoded as follows:

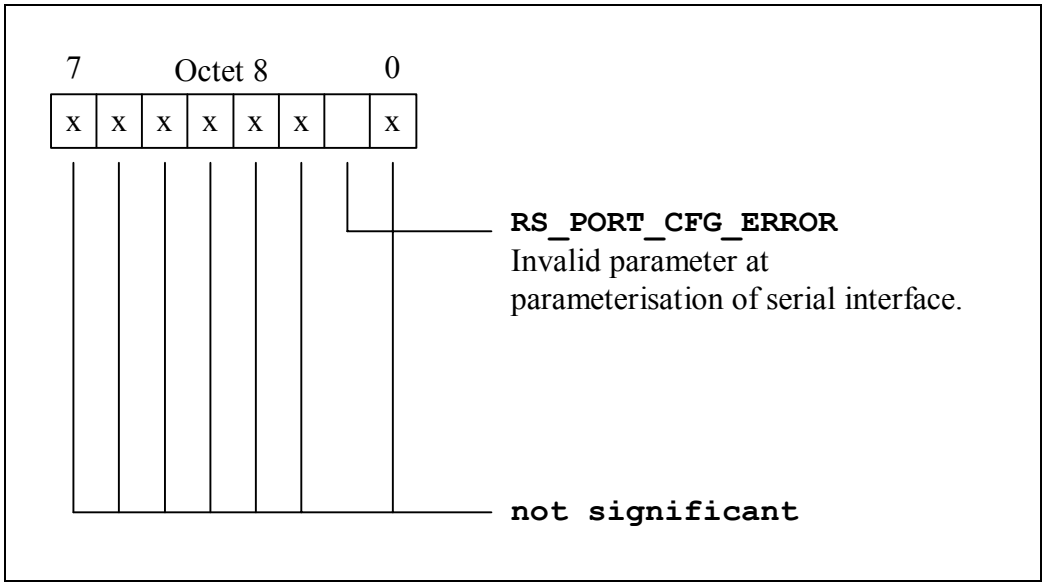


Figure 8: Byte Definition of external Device Diagnostics

4.2 Communication Status

In the status of the confirmation telegram of the service **data_exchange** the status of the serial interface is encoded as follows:

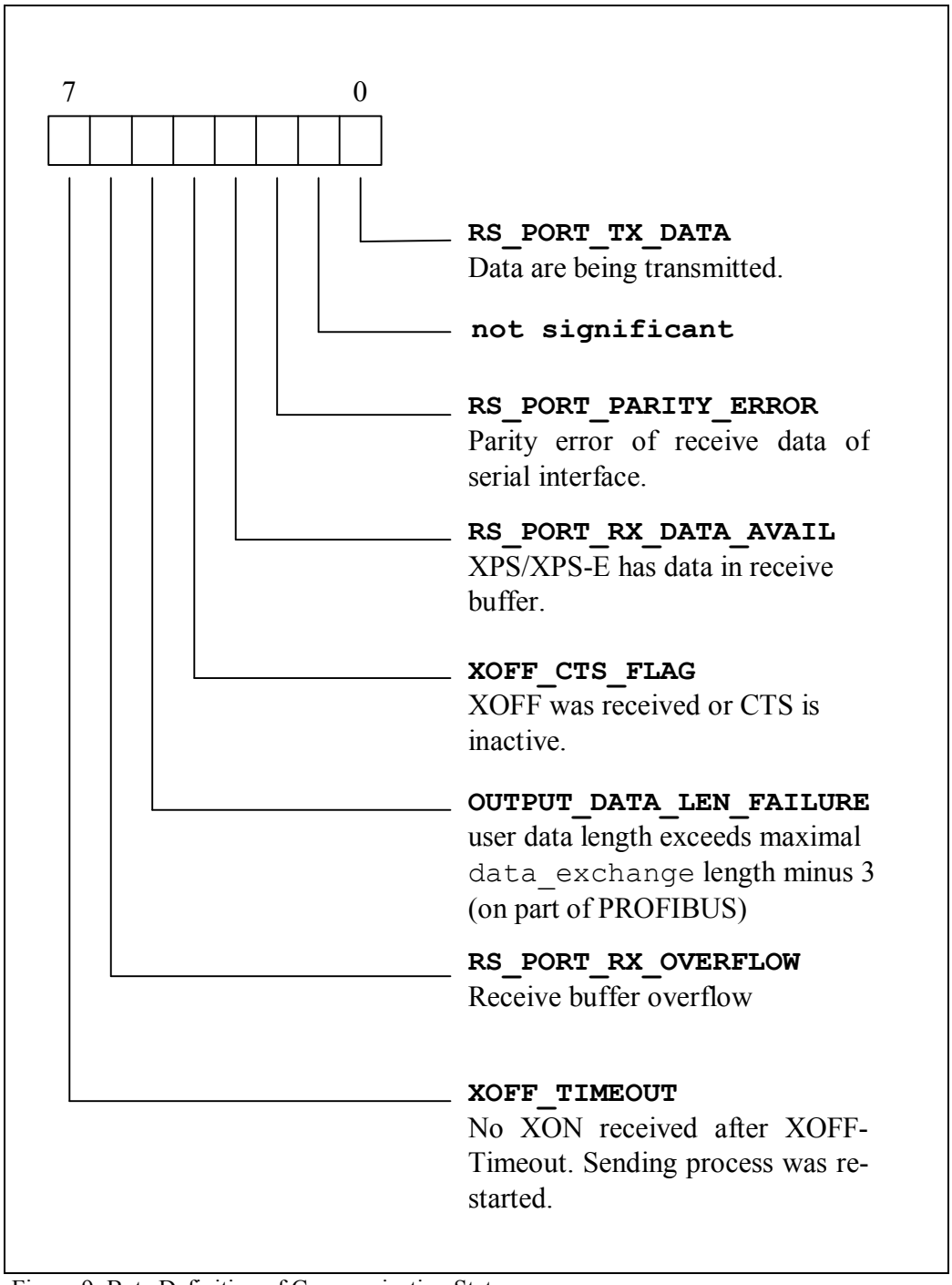


Figure 9: Byte Definition of Communication Status

5 Connector Assignment and Cabling

5.1 PROFIBUS

5.1.1 Connector Assignment

The PROFIBUS connection is executed according to EN50170 as 9-pin female D-SUB with the following assignment:

Pin	RS485 Ref.	Signal	Function	Direction
1	-	-	Shielding	-
2	-	-	NC	-
3	B/B´	RxD/TxD-P	Data (+)	I/O
4	-	CNTR-P	Control character (+)	O
5	C/C´	DGND	Data Ground	-
6	-	VP	Supply for Terminator (+5V)	-
7	-	-	NC	-
8	A/A´	RxD/TxD-N	Data (-)	I/O
9	-	CNTR-N	Control character (-)	O

Table 11: Pin Assignment PROFIBUS

O = Output
I = Input

5.1.2 PROFIBUS Terminating Resistor

For correct operation of XPS/XPS-E both bus terminations of the line segment must be provided with a terminator. This terminator must match with the impedance level of the line. Typically, in case of new PROFIBUS installations, Type A will be used. The assignment of the individual terminating resistors of the terminator is depicted in the following figure.

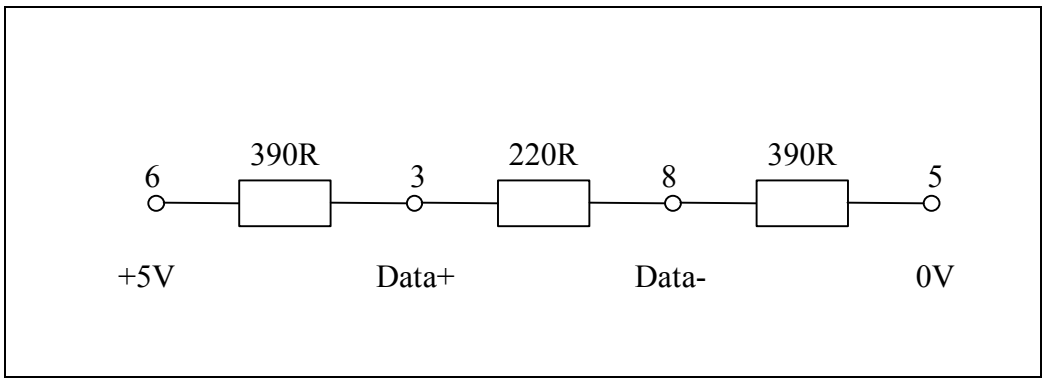


Figure 10: Assignment of PROFIBUS Terminator Type A

Note

You can also order the PROFIBUS Terminator in pre-configured condition (Order No.: 4000-7-002-H, Type A).

5.1.3 Cabling

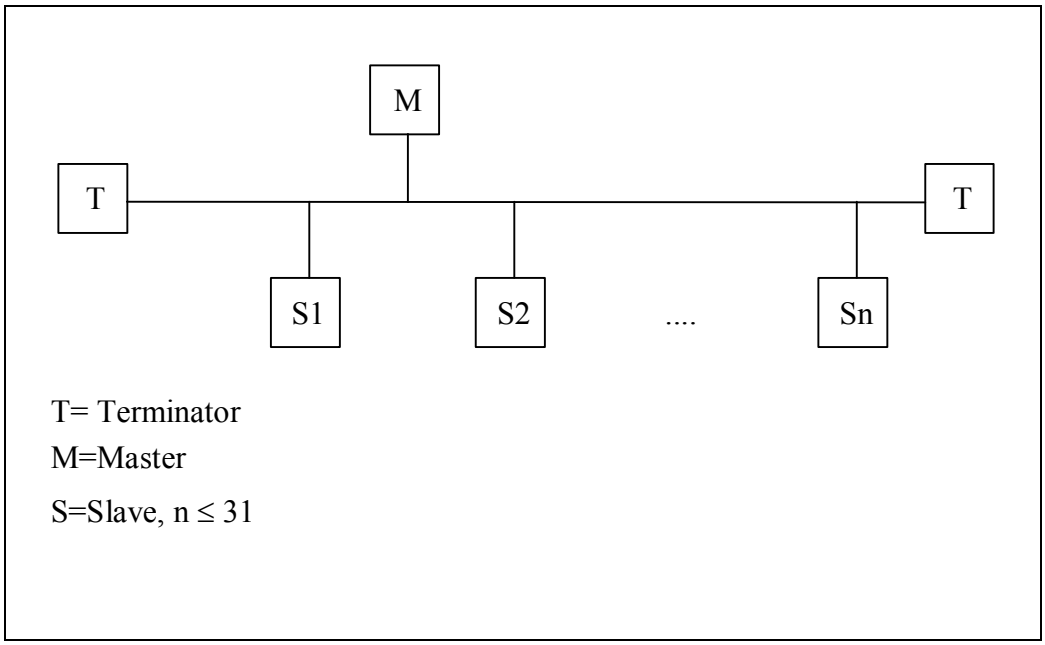


Figure 11: Connection of a PROFIBUS-DP Slave within a Segment

If no terminator with independent power supply shall be used (active terminator), the termination must be realised directly at the last stations of the bus. This station must then supply the terminator with power. For details regarding the PROFIBUS installation please refer to the PROFIBUS Installation Guidelines of the PROFIBUS User Organisation (PNO, Order No.: 2.112).

NOTE *In case of XPS a bus termination is integrated and can be activated via the switch at the front side of the device.*

5.2 Serial Interface

5.2.1 Connector Assignment RS232 (XPS and XPS-E)

The connection is realised via a 9-pin D-SUB plug.

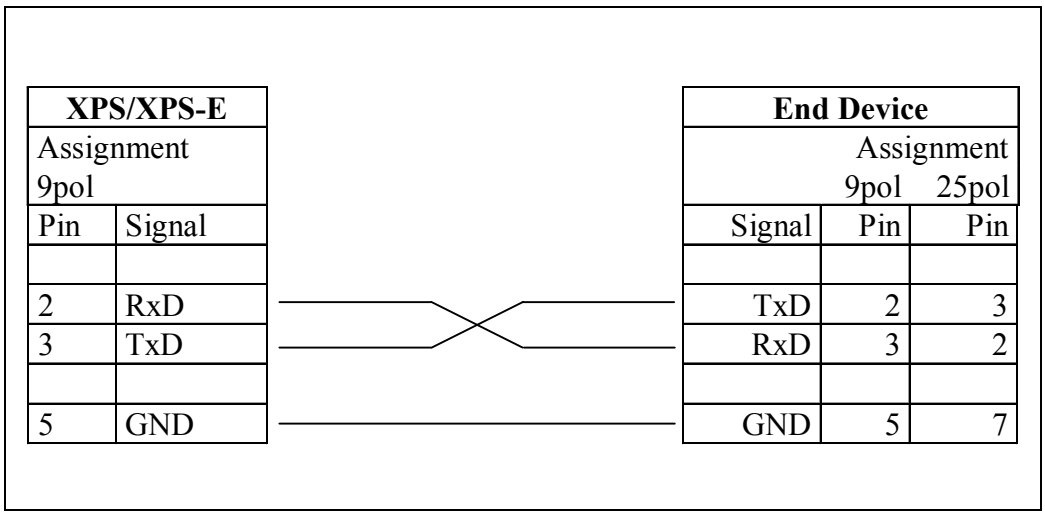
Pin	Signal	FNI	CCITT	Function	Direction
1	DCD	M5	109	Data Carrier Detect	I
2	RxD	D2	104	Receive Data	I
3	TxD	D1	103	Transmit Data	O
4	DTR	S1	108.2	Data Terminal Ready	O
5	GND	E2	102	Ground	---
6	DSR	M1	107	Data Set Ready	I
7	RTS	S2	105	Request to Send	O
8	CTS	M2	106	Clear To Send	I
9	---	---	---	Not connected	---

Table 12: Connector Assignment RS232 Interface

O = Output
I = Input

5.2.2 Cabling RS232

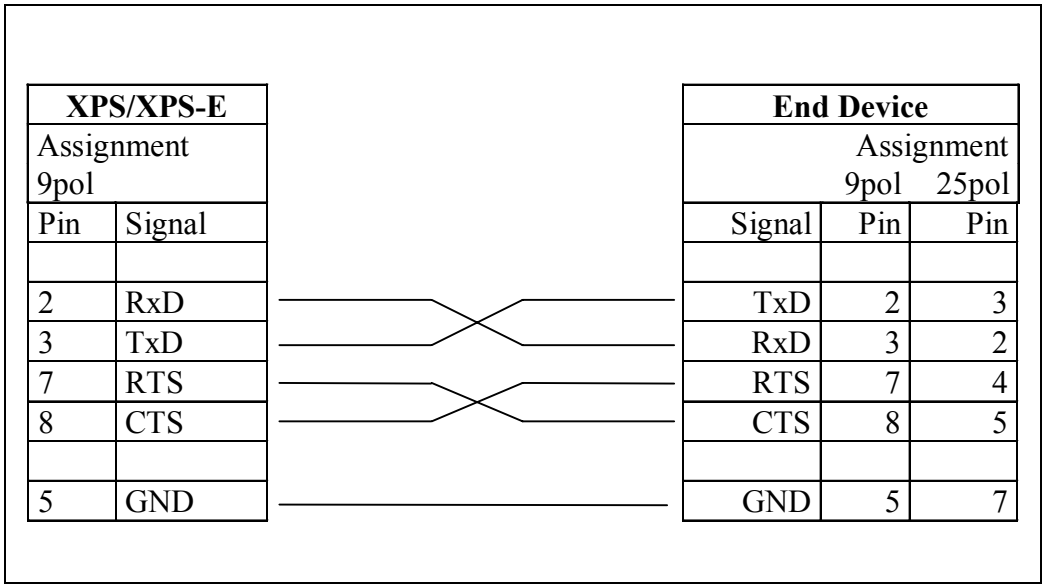
5.2.2.1 Cabling without Hardware Handshake



XPS/XPS-E Assignment 9pol			End Device Assignment 9pol	25pol
Pin	Signal	Signal	Pin	Pin
2	RxD	TxD	2	3
3	TxD	RxD	3	2
5	GND	GND	5	7

Figure 12: RS232 Cabling without Hardware Handshake

5.2.2.2 Cabling with Hardware Handshake



XPS/XPS-E Assignment 9pol			End Device Assignment 9pol	25pol
Pin	Signal	Signal	Pin	Pin
2	RxD	TxD	2	3
3	TxD	RxD	3	2
7	RTS	RTS	7	4
8	CTS	CTS	8	5
5	GND	GND	5	7

Figure 13: RS232 Cabling with Hardware Handshake

5.2.3 Connector Assignment RS422/485 (XPS-E only)

The connection is realised via a 9-pin D-SUB plug.

Pin	Signal	Function	Direction
1	I(B)	Indicate (-)	I
2	R(A)	Receive Data (+)	I
3	T(A)	Transmit Data (+)	O
4	T(B)	Transmit Data (-)	O
5	G	Ground	---
6	R(B)	Receive data (-)	I
7	C(A)	Control (+)	O
8	I(A)	Indicate (+)	I
9	C(B)	Control (-)	O

Table 13: Connector Assignment RS422/485 Interface

O = Output
I = Input

5.2.4 Cabling RS422 without Hardware Handshake

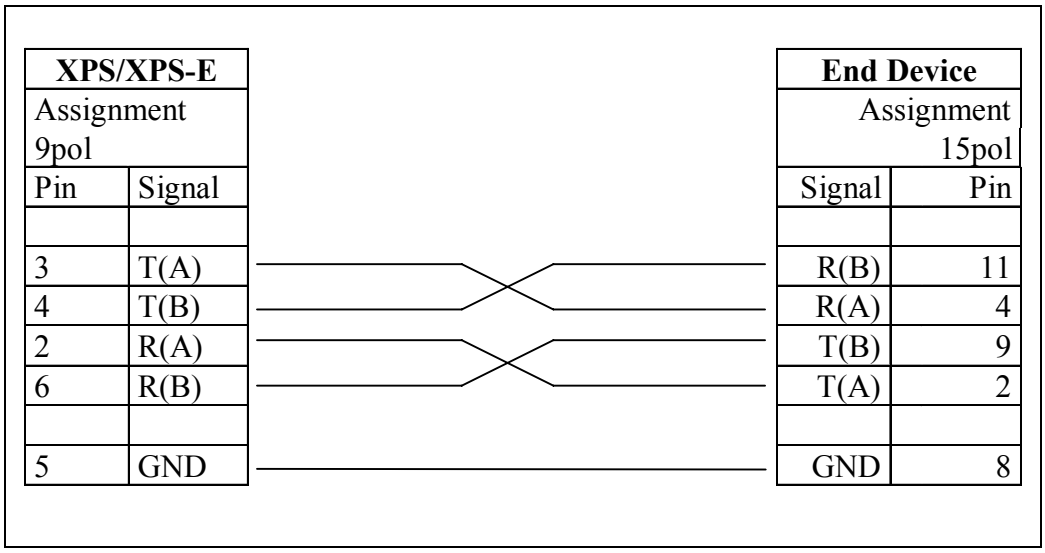
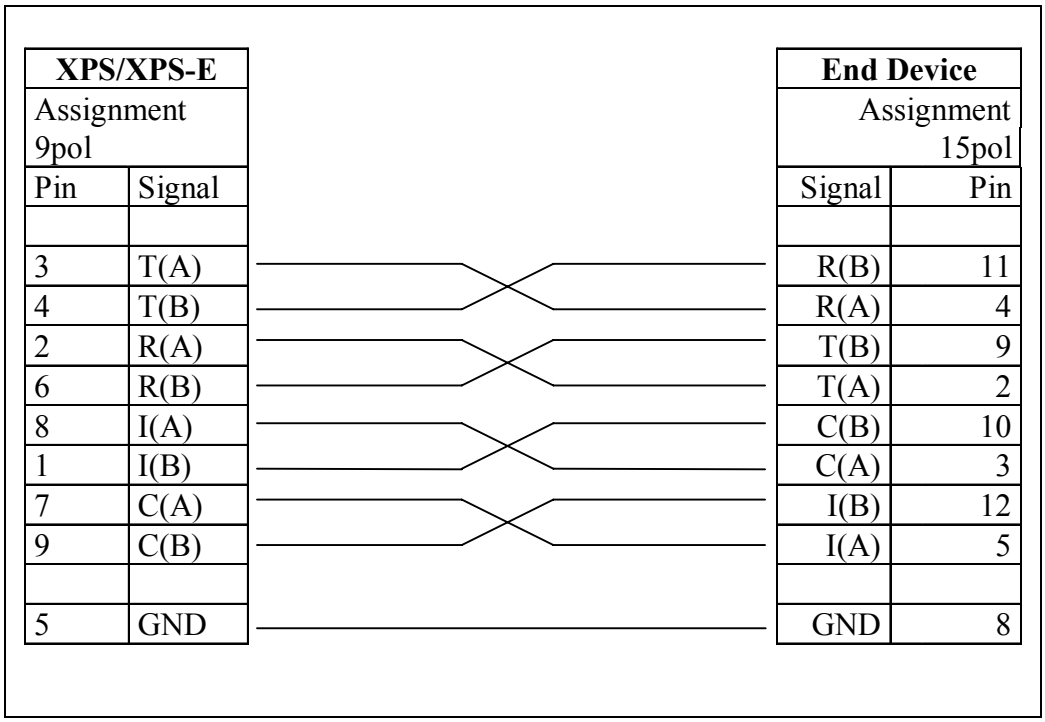


Figure 14: RS422 Cabling with Hardware Handshake

5.2.5 Cabling RS422 with Hardware Handshake



XPS/XPS-E Assignment 9pol			End Device Assignment 15pol	
Pin	Signal		Signal	Pin
3	T(A)		R(B)	11
4	T(B)		R(A)	4
2	R(A)		T(B)	9
6	R(B)		T(A)	2
8	I(A)		C(B)	10
1	I(B)		C(A)	3
7	C(A)		I(B)	12
9	C(B)		I(A)	5
5	GND		GND	8

Figure 15: RS422 Cabling with Hardware Handshake

6 Frequently Asked Questions: FAQ

This section is treating the most frequent application problems and their solutions.

The most current questions and answers can be found under

http://www.comsoft.de

DP-Master Status Message: Status 0xC2 (SAP/Service not activated)

Make sure that the parameterisation sequence of the parameterisation described in section 2.3 has correctly been executed. If necessary, repeat parameterisation.

DP-Master Status message: Status 0xC3 (no acknowledge)

Check the following points:

- Does the station address of the XPS/XPS-E correspond to the setting of the PROFIBUS Master device?
- Are the bus parameters set correctly?
- Is the bus terminated correctly (switch position of the terminator integrated in XPS)?
- Has XPS/XPS-E been connected correctly?

DP-Master Status message: Status 0xC4 (bad telegram)

Check the terminating resistors at the bus. Pay attention to the switch position of the terminating resistor at the XPS.

7 Technical Data

7.1 XPS

7.1.1 PROFIBUS-DP Interface

Transmission protocol:	PROFIBUS-DP according to EN50170-3 Slave coupler
Transmission rates:	9.6Kbit/s , 19.2Kbit/s, 93.75Kbit/s, 187.5Kbit/s, 500Kbit/s, 1.5Mbit/s, 3Mbit/s automatic adjustment
Potential segregation:	Opto-coupler interface and DC/DC transducer Isolation voltage U>500V
Terminating resistor:	TYP A, to be activated via slide switch
Operating modes:	**`Sync_Req`** and **`Freeze_Req`** are not supported.
Addresses:	1 - 99 by encoding switch
Identification Number:	0x9510
Parameterisation Data:	23 Byte (16 Byte User Parameter)
Diagnostics information:	6 Byte System diagnostics acc. to standard 8 Byte device-specific diagnostics
Data_Exchange Buffer:	4 - 240 Byte I/O arbitrarily selectable (3 Byte with Header functionality).
PNO certified:	Z00284

7.1.2 RS232 Interface

Interface:	RS232 interface with handshake signals (RTS, CTS)
Transmission rates:	150bit/s, 300bit/s, 600bit/s, 1.200bit/s, 2.400bit/s, 4.800bit/s, 9.600bit/s, 19.200bit/s
Character Transmission:	8N1, 7N2, 7E1, 7O1
Handshake:	HW (RTS/CTS), SW(XON/XOFF), none
XOFF Timeout:	Adjustable to max. 25,5 seconds
Operating mode:	Poll mode, Request mode, serial triggerd mode
Receive buffer:	2 KByte
Potential segregation:	none

7.1.3 Connection

Power Supply:	international power plug (EN 60320)
PROFIBUS-DP:	9-pin female D-SUB (DIN 41652)
RS232:	9-pin male D-SUB with shield (DIN 41652)

7.1.4 Operating Indicators and Controls

PROFIBUS Status LED:	“green“ means RUN “red“ means BUSFAIL
PROFIBUS address:	window in coding switch

7.1.5 Technical Data

Case:	steel sheet, zinc-coated and lacquered
Dimensions:	175mm x 145mm x 45mm (LxWxH)
Weight:	1kg
Power supply:	230VAC / 25mA
Storage temperature:	-25°C .. +70°C
Temperature range:	0°C .. +55°C non-condensing
Protection class:	1
Protection kind:	IP52
Standards:	CE, EN60950, EN50081-2, EN50082-2

7.2 XPS-E

7.2.1 PROFIBUS-DP Interface

Transmission protocol:	PROFIBUS-DP acc. to EN50170-3 Slave coupler
Transmission rates:	9.6kbit/s, 19.2kbit/s, 93.75kbit/s, 187.5kbit/s, 500kbit/s, 1.5Mbit/s, 3Mbit/s, 6Mbit/s, 12Mbit/s automatic adjustment
Potential segregation:	Opto-coupler interface and DC/DC transducer Isolation voltage U>500V
Operating modes:	**`Sync_Req`** and **`Freeze_Req`** are not supported.
Addressing:	1 - 99 by coding switch
Identification number:	0x9510
Parameterisation data:	23 Byte (16 Byte user parameters)
Diagnostics information:	6 Byte system diagnostics acc. to standard 8 Byte device-specific diagnostics
Data_Exchange Buffer:	4 - 240 Byte I/O selectable (3 Bytes with header functionality).

7.2.2 Serial Interface

Interface:	RS232 interface with Handshake signals (RTS, CTS). RS422/485 interface with Handshake signals (CONTROL, INDICATION). Interface physics can be adjusted via PROFIBUS by means of User_Parameter.
Transmission rates:	150bit/s, 300bit/s, 600bit/s, 1.200bit/s, 2.400bit/s, 4.800bit/s, 9.600bit/s, 19.200bit/s
Character transmission:	8N1, 7N2, 7E1, 7O1
Handshake:	HW (RTS/CTS, CONTROL/INDICATION), SW(XON/XOFF), none
XOFF Timeout:	adjustable to max. 25,5 seconds
Data transmission modes:	Poll mode, Request mode, serial triggered mode
Receive buffer	2 KByte
Potential segregation:	optional

7.2.3 Connection

Power supply:	2-pin spring clip 2,5mm^2 without ferrule 1,5mm^2 with ferrule
PROFIBUS-DP:	9-pin female D-SUB (DIN 41652)
RS-PORT:	9-pin male D-SUB (DIN 41652)

7.2.4 Operating Indicators and Controls

PROFIBUS Status LEDs:	“green” means RUN “red” means BUSFAIL
RS-PORT Status LED:	RxD “red” corresponds to: data will be received TxD “red“ corresponds to: data will be sent Hardware physics “red” corresponds to: RS232 mode
PROFIBUS address:	window at coding switch

7.2.5 Technical Data

Case:	synthetic profile with aluminium front panel, lacquered
Dimensions:	126mm x 90mm x 38mm (LxWxH)
Weight:	190g
Voltage range:	18 – 30VDC
Power assumption:	100mA (24VDC)
Storage temperature:	-25°C .. +70°C
Temperature:	0°C .. +55°C non condensing
Protection class:	1
Protection kind:	IP52
Standards:	CE, EN60950, EN50081-2, EN50082-2

8 PROFIBUS-DP Certificate

ZERTIFIKAT

DIE PROFIBUS Nutzerorganisation e.V. erteilt der

COMSOFT GmbH
Wachhausstraße 5a, D-76227 Karlsruhe
das Zertifikat Nr.: **Z00284** für folgendes Produkt:

Name: **XPS-PROFIBUS-RS232 Gateway**
Modell: **PROFIBUS-DP zu RS232-Gateway als PROFIBUS-Slave**
Version: **HW-Rev. 3**
SW 2.02 18-JUL-1997

Das Zertifikat bestätigt, daß das oben genannte Produkt die Prüfungen auf Konformität für PROFIBUS-DP Slave-Geräte erfolgreich bestanden hat.

Die Prüfungen erfolgten in dem von der PNO autorisierten Prüflabor beim Forschungszentrum Informatik (FZI) in Karlsruhe. Prüfumfang und Prüfergebnis sind im Prüfbericht Nr. 34/2 protokolliert.

Dieses Zertifikat wird erteilt aufgrund der PNO-Richtlinie für Prüfen und Zertifizieren (PRZ) vom 1.1.1993.

Karlsruhe, den 20.08.97 (Bearbeiter)

Der Vorstand der PROFIBUS Nutzerorganisation:

(E. Küster) (K.-P. Lindner)

Figure 16: PROFIBUS-DP Certificate No. Z00284

9 CE- Conformity Declaration

We herewith declare that the PROFIBUS / RS232-RS422/485 Gateway

XPS, XPS-E

corresponds to the requirements stated in the
EU standards 89/336/EWG and 92/31/EWG.

The board corresponds to the following standards:

EN 50082-2 and EN 55022

Manufacturer:
COMSOFT GmbH
Wachhausstr. 5a
D-76227 Karlsruhe